

Amendment dated: December 3, 2004

**Application Serial No.: 10/769,902
Attorney Docket No. 032028-0311140 (23439-099-401)
In Response to Office Action mailed September 10, 2004**

REMARKS

In response to the Final Office Action mailed September 10, 2004, claim 22 has been cancelled without prejudice or disclaimer, and claims 21, 23, and 24 have been amended. No claims have been newly added. Therefore, claims 21 and 23-32 are pending. Support for the instant amendments is provided throughout the as-filed Specification. Thus, no new matter has been added. In view of the foregoing amendments and following comments, allowance of all the claims pending in the application is respectfully requested.

Rejections Under 35 U.S.C. §§102-103

A. Independent Claim 21 and Dependent Claims 22-25.

Claim 21 stands rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 6,025,920 to Dec. *See* Final Action, pg. 2, ¶1. Claims 22, 24, and 25 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Dec in view of U.S. Patent No. 5,831,267 to Jack *et al.* (“Jack”). *See* Final Action, pg. 3, ¶2. Claim 23 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the combination of Dec and Jack, further in view of U.S. Patent No. 4,801,209 to Wadlow. *See* Final Action, pg. 5, ¶3.

Although Applicants disagree with the rejections set forth by the Examiner, claim 21 has been amended to include the subject matter of dependent claim 22 solely in an effort to expedite prosecution. Claim 21, as amended, recites in pertinent part:

“...a source of electromagnetic radiation that emits electromagnetic radiation in a first wavelength region, a second wavelength region, and a third wavelength region, and that is directed through an exhaust emission plume...”

Amendment dated: December 3, 2004

Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

In the Final Action, at pg. 3, the Examiner concedes that Dec fails to disclose one or more sources which emit electromagnetic radiation in a first wavelength region, a second wavelength region, and a third wavelength region. To cure this admitted deficiency of Dec, however, the Examiner proposes combining Dec with Jack, asserting that Jack discloses emitting electromagnetic radiation at a plurality of wavelengths to identify multiple pollutants found within the exhaust plume. Even if the Examiner's allegation with regard to the disclosure of Jack is correct, the combination of Dec and Jack is improper for *at least* the reason that there is no proper motivation to modify Dec to include the teachings of Jack. In the Final Action, at pg. 3, the Examiner states:

"It would have been obvious to...modify Dec to include the teachings of Jack et al. because detection of multiple wavelengths allows the skilled artisan to determine multiple constituents within an emission plume..."

This motivational statement is improper because the modification of Dec to include detecting electromagnetic radiation would not enable the system disclosed in Dec to detect multiple constituents within an emission plume, as is allegedly described in Jack, without changing the principle of operation of Dec. *See* MPEP §2143.02.

Dec is apparently drawn to a method and apparatus for determining the opacity of exhaust plumes from moving emissions sources. *See* Dec, e.g., Abstract. Determining the opacity of exhaust plumes is primarily useful in determining the concentration of particulate matter in Diesel engine exhaust by detecting radiation that has passed through an exhaust plume, and measuring how much of all the radiation directed at the plume has been scattered, reflected, or otherwise blocked by particles present in the plume. *Id.* at col. 1, lines 16-21.

Jack appears to disclose a system for detecting levels of gaseous molecular species present in gasoline engine exhaust. The levels of gaseous molecular species may be

Amendment dated: December 3, 2004

Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

determined by passing radiation through an exhaust plume of a gasoline engine and detecting how much radiation was absorbed around spectral bands that each relate to a molecular species. *See* Jack, *e.g.*, col. 4 lines 10-17.

Since opacity is measured in the apparatus described in Dec by detecting the light that passes through an exhaust plume independent of wavelength, modifying Dec to include radiation of multiple wavelengths would not provide the benefits alleged by the Examiner in detecting opacity as disclosed by Dec, and thus would not have been obvious in light of the disclosures of Dec and Jack. Further, modifying Dec to include detecting multiple wavelength regions to determine levels of gaseous emission constituents based on absorption in specific spectral bands would change the principle of operation because Dec is drawn to detecting a transmittance of radiation directed through an exhaust plume without regard for wavelength to determine an amount of particulate matter present in the exhaust plume.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness for *at least* failing to provide proper motivation to combine Dec and Jack. Accordingly, the rejection of claim 21 is improper and should be withdrawn. Applicants further submit that dependent claims 22-25 are allowable because they depend from allowable independent claim 21, as well as for the further limitations they contain.

B. Independent Claim 26 and Dependent Claims 27-28.

Claims 26 and 27 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the combination of Dec and Jack, further in view of in view of U.S. Patent No. 5,884,226 to Andersen *et al.* (“Andersen”). *See* Final Action, pg. 6, ¶4. Claim 28 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the combination of

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Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

Dec, Jack, and Andersen, further in view of Wadlow. *See* Final Action, pg. 8, ¶5. Applicants traverse these rejections for *at least* the reason that the combinations of references relied upon by the Examiner fail to disclose, teach, or suggest all of the features of the claimed invention.

Claim 26 recites, *inter alia*, the claim elements of:

“...obtaining a measurement of an exhaust constituent amount (*n*) in a spatial volume of an exhaust emission plume;”

“...measuring a transmittance (*T*) of the beam of substantially monochromatic electromagnetic radiation;

calculating an opacity value (*K_s*) proportional to the relation

$$K_s = \frac{\ln(1/T)}{n}.$$

In the Final Action, at pg. 6, the Examiner concedes that Dec does not teach these claim elements, but alleges that such features are suggested in Jack and Andersen.

Particularly, the Examiner relies on Jack for a teaching of obtaining a measurement of an exhaust constituent amount in an exhaust emission plume. *See* Final Action, pg. 6. Assuming arguendo that Jack includes such a teaching, the combination of Dec and Jack proposed by the Examiner is improper because of a lack of proper motivation to combine the references. More particularly, the references themselves appear to teach away from combination.

As was addressed above, Dec appears to be drawn to a method and apparatus for determining the opacity of exhaust plumes from moving emissions sources. *See* Dec, *e.g.*, Abstract. Determining the opacity of exhaust plumes is primarily useful in determining the concentration of particulate matter in Diesel engine exhaust. *Id.* at col. 1, lines 16-21. Particulate matter produced by a Diesel engine may be detected because, while Diesel engines

Amendment dated: December 3, 2004

Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

are typically not considered a significant source of gaseous pollutants, particulate matter generated by such engines may contribute a substantial source of pollution.

Jack, by contrast, appears to disclose a system for detecting levels of gaseous molecular species present in gasoline engine exhaust. *See Jack, e.g., col. 4, lines 10-17.* Jack teaches that this detection is useful for monitoring environmental pollution. *See Jack, e.g., col. 1, lines 6-7.*

Since the method and apparatus of Dec are designed for detecting pollution in the form of particulate matter emitted by Diesel engines, there would have been no motivation to combine features of the system of Jack designed to detect levels of gaseous molecular species because gaseous molecular species are not typically present at significant levels in the emissions of Diesel engines. Further, the references themselves appear to teach away from combination because Dec apparently discloses a method and apparatus for use in monitoring vehicle exhaust produced by engines that do not generate significant amounts of gaseous pollutants, and Jack is apparently intended for monitoring gaseous pollutants.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness for *at least* failing to provide proper motivation to combine Dec and Jack. Accordingly, the rejection of claim 26 is improper and should be withdrawn. Applicants further submit that dependent claims 27 and 28 are allowable because they depend from allowable independent claim 26, as well as for the further limitations they contain.

With regard to Andersen, the Examiner alleges that the disclosure teaches “calculating an opacity value proportional to the relation $K_s = \ln(1/T)/n$.” *See Final Action, pg. 6.* The passages of Andersen cited by the Examiner appear to refer to Beer’s law, which is provided in Applicant’s Specification at pg. 23, lines 18-22. Beer’s law is typically defined as

Amendment dated: December 3, 2004

Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

$T = e^{-k_s n_s}$, or after some manipulation as $k_s = \frac{\ln(1/T)}{n_s}$, where n_s is the amount of smoke per

unit cross-section of the light beam. An amount of smoke is different than an exhaust constituent amount. Thus, a mere reference to Beer's law, such as that found in the cited portions of Andersen, does not teach or suggest the above feature of the claimed invention.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness for *at least* the reason that the combination of Dec, Jack, and Andersen fails to disclose, teach, or suggest all of the features of independent claim 26. Accordingly, the rejection of claim 26 is improper and should be withdrawn. Dependent claims 27 and 28 are allowable at least because they depend from allowable independent claim 26, as well as for the further limitations they contain.

Concerning the rejection of claim 28, the Examiner concedes that neither Dec, Jack, nor Andersen teach generating emission spectra in the ultra-violet range 200 nm – 400 nm. *See* Final Action, pg. 8. The Examiner alleges that Wadlow includes this feature. *See* Final Action, pg. 9. Assuming arguendo that the Examiner's assertion with respect to the disclosure of Wadlow is correct, the rejection based on Dec, Jack, Andersen, and Wadlow is improper for *at least* failing to provide a proper motivation or suggestion to combine all four references.

Wadlow appears to be directed toward analyzing samples of gaseous mixtures located within a chamber. *See* Wadlow, *e.g.*, col. 2, lines 24-36. The Examiner cites Wadlow at column 4, line 59 - column 5, line 14 as allegedly providing motivation for combination. *See* Final Action, pg. 9. However, the cited portion of Wadlow appears to teach aspects of the invention directed toward discerning between argon, oxygen, and nitrogen within a sample

Amendment dated: December 3, 2004

**Application Serial No.: 10/769,902
Attorney Docket No. 032028-0311140 (23439-099-401)
In Response to Office Action mailed September 10, 2004**

contained in the chamber. Since none of the other references cited appear to be concerned with discerning between argon, oxygen, and nitrogen gases, the motivation to combine the references based on this passage of Wadlow is improper.

Further, the passage of Wadlow cited by the Examiner discloses that the spectrum of radiation used to detect the gases should be varied along the length of the chamber. *See* Wadlow, *e.g.*, col. 5, lines 6-10. However, none of the other references presented by the Examiner appear to include a chamber, but rather appear to be drawn to detection in open air environments. Thus, one of ordinary skill in the art would not have been motivated to combine Wadlow with Dec, Jack, and Andersen because there would have been no reasonable expectation of success in adapting the teachings of Wadlow regarding the arrangement of radiation passing through a chamber to systems designed for detection in open air environments.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness *at least* because there is no proper motivation for combining Dec, Jack, Andersen, and Wadlow. Accordingly, the rejection of claim 28 improper and should be withdrawn.

C. Independent Claim 29 and Dependent Claims 30-32.

Claims 29, 31, and 32 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the combination of Dec and Jack, further in view of in view of Andersen. *See* Final Action, pg. 6, ¶4. Claim 30 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the combination of Dec, Jack, and Andersen, further in view of Wadlow. *See* Final Action, pg. 8, ¶5.

Amendment dated: December 3, 2004

Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

Applicants note that the rejections of claims 26-28 are identical to the rejections applied to claims 29-31 by the Examiner. As such, the rejections of claims 29-31, and 32 (which depends from claim 29) are improper for *at least* the reasons set forth above with respect to claims 26-28. Accordingly the rejections of these claims should be withdrawn.

Claim 32 recites, *inter alia*, measuring “...an amount proportional to the sum carbon monoxide and carbon dioxide...” The Examiner concedes that Dec and Andersen do not teach or suggest “measuring an amount proportional to the carbon monoxide and an amount proportional to the carbon dioxide.” *See* Final Action, pg. 8. The Examiner alleges that Jack discloses measuring “an amount proportional to the carbon monoxide and an amount proportional to the carbon dioxide.” *See id.*, pg. 8. The Examiner concedes, however, that Jack does not include “summing the carbon dioxide and the carbon monoxide.” *See id.*, pg. 8. The Examiner states that summing these constituents would be “inherently obvious” to enable a determination of the total value of oxygenated carbons. *See id.* It is unclear to Applicants whether this is a rejection based on an alleged inherent feature of the disclosure of Jack, or a rejection based on an allegedly obvious modification of Jack. In either case, the rejection made by the Examiner is improper for *at least* failing to teach or suggest all of the features of the claimed invention.

Even if Jack does disclose measuring an amount proportional to the carbon monoxide and an amount proportional to the carbon dioxide, Jack does not inherently disclose summing the carbon dioxide and the carbon monoxide, as the Examiner apparently maintains.

In rejecting this feature based on an alleged obviousness of combining the carbon monoxide and the carbon dioxide in the system of Jack, Applicants infer that the Examiner is

Amendment dated: December 3, 2004

Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

taking Official Notice with respect to this modification of the disclosure of Jack, and request documentation of the alleged obviousness of this modification.

For *at least* the reasons set forth above, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness *at least* because Dec, Jack, and Andersen do not disclose, teach, or suggest all of the features of the claimed invention. Accordingly, the rejection of claim 32 is improper and should be withdrawn.

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Application Serial No.: 10/769,902

Attorney Docket No. 032028-0311140 (23439-099-401)

In Response to Office Action mailed September 10, 2004

CONCLUSION

Having addressed each of the foregoing rejections, it is respectfully submitted that a full and complete response has been made to the outstanding Office Action and, as such, the application is in condition for allowance. Notice to that effect is respectfully requested.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

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Respectfully submitted,

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